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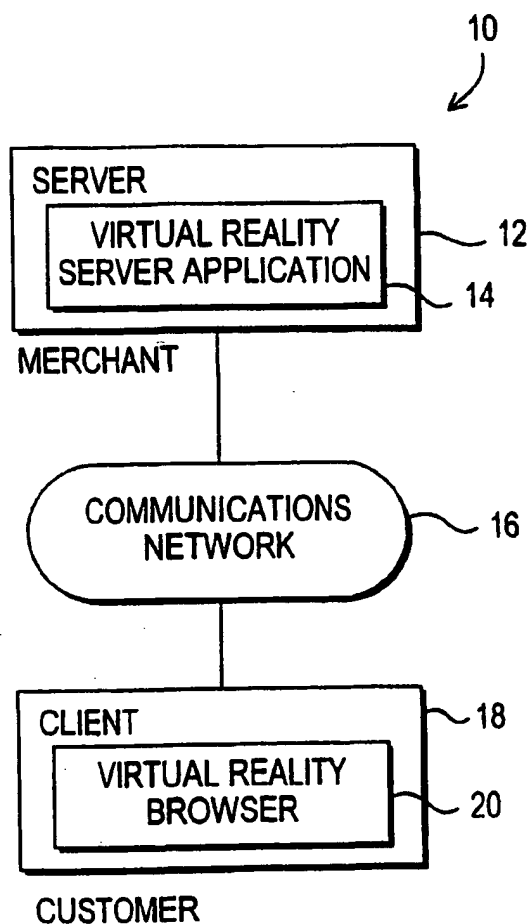
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(54) Title: **NATURAL USER INTERFACE FOR VIRTUAL REALITY SHOPPING SYSTEMS**



(57) Abstract: A virtual reality shopping system that supports shopping over communications networks such as the Internet is provided. The shopping system has a server for providing interactive three-dimensional content to a client. The three-dimensional content may represent the interior of a virtual store or shopping mall. The user at the client may navigate through the three-dimensional content in real time. The user may click and drag three-dimensional items of interest into a shopping cart. A map may be provided that shows the layout of the interior of the virtual store. Department options may be provided that automatically take the user to the appropriate department of the store. Product category options may be provided that allow the user to locate products in various categories. A search option may be used to search for desired products. A product details region may be used to provide additional information on selected products. A clip of moving images of a product may be provided when the user clicks on a product in the three-dimensional view. The clip may be presented in the form of a rotating and zooming image of the product.

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NATURAL USER INTERFACE FOR  
VIRTUAL REALITY SHOPPING SYSTEMS

Background of the Invention

This invention relates to on-line shopping  
5 systems, and more particularly, to on-line shopping  
systems that use three-dimensional images to create a  
virtual reality environment.

Virtual reality systems are well known. Such  
systems present users with computer-generated three-  
10 dimensional images. In virtual reality gaming  
applications, for example, users may be presented with  
three-dimensional images of various scenes through  
which the user must navigate using a joystick or a  
mouse. Virtual reality systems are also being used in  
15 various educational and training applications.

Various systems are available for providing  
an interactive three-dimensional experience over the  
Internet. For example, web browser software is  
available that allows users to view interactive three-  
20 dimensional content over the Internet. In e-commerce  
applications, such virtual reality browsers may allow  
users to shop for products in virtual stores.

It is an object of the present invention to  
provide ways in which users may intuitively interact  
25 with three-dimensional content over the Internet.

It is a further object of the present invention to provide ways in which users may interact with three-dimensional shopping environments.

5 Summary of the Invention

These and other objects of the invention are provided in accordance with the principles of the present invention by providing a virtual reality system in which users may interact with three-dimensional  
10 environments using a natural user interface. The natural user interface may be used to assist the user in shopping in three-dimensional stores.

The system may use a server to provide interactive content to the user at a client over the  
15 Internet or other communications network.

An interactive three-dimensional view region may be used to present views of a virtual reality shopping environment such as the interior of a virtual store or mall. Various navigational options may be  
20 used to assist the user in navigating through the virtual shopping environment. For example, the user may be provided with options that allow the user to control the direction of the user's movement, the speed of movement, etc.

Options may be provided that allow the user  
25 to move forward through the environment or in reverse.

A map may be displayed on the display of the client at the same time as the three-dimensional view region. The map may provide an overview of the layout  
30 of the virtual store. If desired, the map may be interactive. The user may click on a portion of the map to navigate to a particular region of the store. The map may contain a position indicator that shows the

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user's current location and orientation.

A user may click and drag items displayed in the three-dimensional view region into a shopping cart or other such area. This adds the items to a shopping  
5 cart list. The user may view the shopping cart list to review the items that the user has selected for purchase, to review prices, to review the total cost of all items selected for purchase, etc.

Department options may be provided. The user  
10 may select a desired department option to direct the shopping service to take the user to that department of the store.

Product category options may be displayed using text or images. When the user selects a desired  
15 product category, information on products in that category may be displayed. A search option may also be used to allow users to search for products of interest.

Product details may be provided for products that the user navigates to or that the user selects by  
20 pointing and clicking in the interactive three-dimensional view region.

Product information may be displayed in the form of clips of moving images. As one example, the product information may include a clip that shows a  
25 selected product being rotated, enlarged (i.e., zoomed in on), or rotated and enlarged (a rotational zoom) in real time. This feature allows the user to carefully inspect a product prior to purchase.

Options may be provided that allow the user  
30 to view specials and to contact customer service. For example, an on-screen button may be provided that the user may select to send an e-mail to a customer service representative or to contact customer service in real

time using a voice connection over the Internet or the like.

Advertisements may be displayed in the three-dimensional view region. The user may click on the  
5 advertisements to obtain information or to order products.

Further features of the invention, its nature and various advantages will be more apparent from the accompanying drawings and the following detailed  
10 description of the preferred embodiments.

#### Brief Description of the Drawings

FIG. 1 is a schematic diagram of an illustrative virtual reality shopping system in accordance with the present invention.

15 FIG. 2 shows an illustrative virtual reality shopping screen that may be displayed by the system when a user is entering a virtual reality sports store in accordance with the present invention.

FIG. 3 shows an illustrative screen that may  
20 be displayed when it is desired to showcase a product in accordance with the present invention.

FIG. 4 shows an illustrative screen that may be displayed when a user is selecting a desired item in the store in accordance with the present invention.

25 FIG. 5 shows an illustrative screen that may be displayed when a user is dragging a product into a shopping basket in accordance with the present invention.

FIG. 6 shows an illustrative screen that may  
30 be displayed after an item has been added to the user's shopping basket in accordance with the present invention.

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FIGS. 7a-7e show how a moving and enlarged three-dimensional image of a product may be displayed when a user selects the product in accordance with the present invention.

5           FIG. 8 shows an illustrative screen that may be displayed when a user is shopping in a virtual reality supermarket in accordance with the present invention. The screen may contain a product details region.

10           FIGS. 9 and 10 show how the image in the product details region may be presented as a video clip or moving image in accordance with the present invention.

            FIG. 11 shows an illustrative screen that may  
15 be displayed when the user clicks on a shopping cart option in accordance with the present invention.

            FIG. 12 shows an illustrative screen that may be displayed in a virtual art store in accordance with the present invention. A status indicator icon may be  
20 displayed in the main view window.

            FIG. 13 shows an illustrative screen that may be displayed when the user has clicked on the status indicator of FIG. 12 in accordance with the present invention.

25           FIG. 14 shows an illustrative status indicator icon in accordance with the present invention.

            FIG. 15 is a flow chart of illustrative steps involved in providing the virtual reality shopping  
30 service in accordance with the present invention.

#### Detailed Description of the Preferred Embodiments

An illustrative virtual reality system 10 for

providing interactive two-dimensional and three-dimensional content to users over the Internet or other communications network is shown in FIG. 1. An on-line merchant may use a server 10 on which a virtual reality  
5 server application 14 is implemented to provide virtual reality content to a customer or other user over communications network 16. The user may access the content using a client 18 on which a virtual reality browser 20 is implemented.

10 The on-line merchant may offer any suitable products or services for sale, including food, clothing, electronics goods, sports equipment, entertainment products, software, games, information and consulting services, etc. Server 12 may be a  
15 mainframe computer, a workstation, a personal computer, or any other computer or a combination of such computers. Virtual reality server application 14 may be provided as part of or in addition to a web server application or other suitable server application for  
20 providing interactive content to client processors.

Communications network 16 may be a broadband communications network, an asynchronous transfer mode (ATM) network or other packet-based network, the public  
switched telephone network (PSTN), the Internet, a  
25 combination of such networks, or any other suitable network.

Client 18 may be a personal computer, a portable computer such as a notebook or laptop computer, a handheld computing device such as a  
30 handheld computer or personal digital assistant, or any other suitable computing device that has a monitor or other display and that communicates with network 16. Client 18 may communicate with communications network



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over any suitable wired or wireless communications path.

Virtual reality browser 20 may be a stand-alone application for decoding and displaying three-dimensional content or may use a plug-in virtual reality application that operates in conjunction with a web browser application. Virtual reality content may be encoded using virtual reality modeling language (VRML), the X3D language, or any other suitable encoding scheme.

As an example, an arrangement may be used in which server 12 sends client 18 a reference view of a three-dimensional image and a model to use to extrapolate a new view from the reference view based on the user's inputs at client 18. Client 18 may send server 12 a record of the user's virtual movements. Client 18 and server 12 may generate model-based extrapolations from the reference view. Server 12 may also perform an exact update of the reference view. When the extrapolated reference view deviates too much from the updated reference view, server 12 may send client 18 information on the difference between the extrapolated and updated reference views, so that client 12 may update its reference view.

Virtual reality browser 20 may present two-dimensional and three-dimensional content to the user. The content that is displayed for the user may include two-dimensional web content and three-dimensional content that is created using three-dimensional modeling and animation tools such as the Studio MAX package available from Kinetix (a division of Autodesk Inc.) of San Francisco, California. Streaming Internet video and downloaded video clips may also be

incorporated into the virtual reality content displayed for the user by virtual reality browser 20. Such video content may be provided using any techniques for streaming and downloading video data over the Internet or other networks.

Various arrangements may be used to provide users with access to virtual reality shopping content. For example, users may be provided with access to the stores of various different merchants through a virtual three-dimensional mall. The user may express interest in a particular merchant by clicking on the storefront display of a virtual store of interest. Clicking on the storefront may direct the system to connect the user to an associated shopping service.

An illustrative screen that may be displayed on client 18 when a user chooses to shop in a sporting goods store is shown in FIG. 2. Screen 22 may contain a three-dimensional view region 24. The images displayed in region 24 may be three-dimensional views of the interior of the virtual store.

A navigation or status indicator icon 26 may be used to provide the user with status information and to assist the user in navigating through the images displayed in region 24. Directional arrow options 28, 30, and 32 or other suitable navigation options may be used to change the direction of the user's travel through the virtual store.

In the example of FIG. 2, the user is just entering the golf section of a sporting goods store. Screen 22 may contain an overview region 34 that includes one or more maps containing information on the user's present position in the virtual store. Region 34 may include a high-level map 34a of the various

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departments in the store. The department in which the user is presently located may be highlighted (e.g., marked in a different color or the like). Region 34 may also include a more detailed map such as department  
5 map 34b.

The location of the user within the department and the user's current orientation may be displayed using a position indicator such as position indicator 36. Position indicator 36 may be displayed  
10 in map 34b. In the example of FIG. 2, position indicator 36 is triangular in shape. The direction in which the narrow tip of the triangle points indicates the user's current orientation. The user's current orientation is the direction in which the user is  
15 looking, as reflected by the view displayed in region 24.

When the user identifies a product of interest in region 24, the user may click on that item or otherwise select the item using a mouse, track ball,  
20 touch pad, keys, touch screen, or any other suitable pointing device or user input device. The user may then drag the item of interest into shopping basket region 38.

Region 40 may be used to display product  
25 details, shopping cart status information, customer service information, or any other suitable information related to the virtual shopping service.

Tabs or options 42, 44, and 47 may be provided to allow the user to switch between the  
30 various functions listed on the tabs. In the example of FIG. 2, information on a particular type of golf club is provided in region 40, because the product details tab (tab 42) has been selected.

The user may add an item being displayed in region 40 to the user's shopping cart using add to cart option 45. The user may modify the quantity of the product being added to the shopping cart using quantity option 42.

Customer service tab 47 may be used to access customer service.

Region 46 of screen 22 may be used to provide access to product search results, to display a product list, to display information on special offers, etc. The user may view a product list by selecting tab 48. The user may access search results by selecting tab 50. Information on specials may be displayed when the user selects tab 52.

The user may search for a product by entering the product name in search region 54 and by clicking on go option 56. If matching products are located, the search results may be automatically displayed in region 46.

If the user selects great values tab 52, the user may be presented with interactive advertisements and information on specials.

When the user selects product list tab 48, a list of products may be displayed in region 46, as shown in FIG. 2. The user may scroll through the products using scroll options 58 and 60. If the user clicks on one of the products displayed under the product name category of region 46, the user may be provided with additional information on the product. If the user clicks on one of the add to cart options under the add to cart heading of region 46, the corresponding product may be added to the user's shopping basket. If the user clicks on one of the go

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there options in region 46, the user may be taken to the virtual location within the store for the product associated with the selected option. For example, if the user selects the go there option associated with  
5 the product Star graphite clubs, the user may be taken to the location in the store where those clubs are featured. The image displayed in region 24 and the navigational indicators in region 34 may be updated to reflect the user's new location.

10           Product category options 62 may be provided. When the user selects one of the product category options 62, information for products in that category may be displayed in the product list in region 46. In the example of FIG. 2, the product category option 62a  
15 for golf clubs has been selected and the products in the product list are golf clubs.

Department options 64 may be provided on screen 22. When a user selects a department option, the product category options 62 may be updated to  
20 reflect the selected department. In the example of FIG. 2, the user has selected the golf department (as indicated by the darker color of golf department option 64a), so the product category options 62 that are displayed represent various different categories of  
25 golf-related products.

If desired, the user may navigate to another department of the virtual store by clicking on the desired department in store map 34a. The user may also drag position indicator 36 to another location within  
30 department map 34b.

Web links such as web links 66 may be included on screen 22 to allow the user to access other options available through the shopping service. For

example, check out link 66a may be used to provide the user with an opportunity to complete the user's order. The user may supply the shopping service with financial information such as credit card information and may  
5 supply the shopping service with shipping information such as the user's home address.

Shopping cart link 66b is another option that may be provided. Clicking on link 66b may direct the shopping service to display the contents of the user's  
10 shopping basket. Great values link 66c may link the user to a web page or other information that offers various specials. Customer service link 66d (and customer service tab 46) may provide the user with a  
15 link to customer service features. Such features may include, for example, the ability to send e-mail to customer service, the ability to place a telephone call to customer service (using a conventional telephone or an on-line connection), the ability to videoconference with a customer service representative in real time  
20 (e.g., if the user or the customer service representative or both have a video camera connected to their computers).

In screen 22 of FIG. 2, the user has clicked on icon 26, which has caused the user to stop moving.  
25 If the user clicks on icon 26, the user may move through the store using directional arrow options 28, 30, and 32. The appearance of icon 26 may be changed to indicate the user's mobile status, as shown in FIG.  
3.

30 When the user enters a particular area in a department, product information on relevant merchandise in the department may be automatically displayed in regions 40 and 46. In the example of FIG. 3, the

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product list information shown in region 46 has been updated to contain information on various shirts that are available for purchase, because the user has entered the shirt area of the golf department. An  
5 image of a shirt may be shown in product details region 40a in synchronization with the shirts being shown in three-dimensional view region 24.

The user may select items of interest using a mouse or other pointing device. A user may place a  
10 pointer on top of merchandise being displayed in the three-dimensional view region 24. When the user points to an item of interest, the pointer may be replaced with an icon of a hand, as shown by hand icon 68 in FIG. 4. A pop-up text label may also be displayed that  
15 provides information about the item. If the user continues to hold the left mouse button (or other appropriate control depending on the user interface), the user may drag the selected item to shopping basket 38. While the user is dragging the selected item, an  
20 icon such as icon 70 of FIG. 5 may be displayed as a visual confirmation to the user that the item has been selected.

When the selected item is dropped into shopping basket 38, information regarding the current  
25 contents of the user's shopping cart may be automatically displayed in region 40, as shown in FIG. 6. Scroll buttons 72 and 74 may be used to scroll through the shopping cart list. The user may remove an item from the list by clicking on the remove option 75.

30 In the example of FIGS. 4-6, the user selected the desired item (i.e., the Ranger's cap) from a shelf 76. If desired, virtual items may be presented using other suitable display structures, such as racks,

drawers, showcases, etc. Some such structures may involve moving parts. For example, a drawer may need to be pulled open before the user may see the contents of the drawer. The user may manipulate the display  
5 structures by clicking and dragging or using any other suitable technique.

Sometimes the user may desire to view an item more closely before making a purchase. Various techniques may be used to enlarge or otherwise allow  
10 the user to more closely inspect a desired item. For example, the user may be presented with a thumbnail view of a close-up image of the item. If the user clicks on the thumbnail, the close-up images may be displayed at a sufficient size to allow the user to  
15 make an informed decision regarding the item.

The user may also click directly on products as they are being displayed on virtual shelves within three-dimensional view region 24. Clicking on the product may direct the shopping service to provide more  
20 detailed information on the product. Such information may be displayed, for example in region 40 or in any other suitable region of screen 22.

If desired, the shopping service may use various graphical effects to present additional  
25 information or enlarged views to the user. As an example, a clip may be displayed for the user in which an item is rotated, so that the user may view all sides of the item before making a purchase. The item may also be tilted or enlarged. A continuous zoom effect  
30 may be used, so that the selected item appears to grow continuously in size as the service zooms in on the item.

An illustrative example of this type of



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effect is shown in FIGS. 7a-7e. The images of FIGS. 7a-7e may be displayed for the user in three-dimensional viewing region 24.

Initially, the user may select a desired shoe  
5 78 from the shelf of shoes shown in FIG. 7a (e.g., by clicking on that shoe). When the user clicks on shoe 78, the shopping service automatically rotates the shoe in multiple dimensions simultaneously and brings the shoe closer to the user's view. In FIG. 7b, shoe 78 is  
10 shown just after being selected. The shoe has been rotated slightly about its longitudinal axis, so that the tops of the laces are visible. The shoe has also been rotated slightly about an axis perpendicular to the sole of the shoe, so that the heel is beginning to  
15 face the viewer. In addition, the shoe has been moved closer to the user's viewpoint, so that it appears larger than in FIG. 7a. In FIG. 7c, these movements continue, so that the user may view the interior of the shoe. By FIG. 7d, the label on the inner surface of  
20 the shoe's tongue is clearly visible, so that the user may view details regarding the shoe. The image of the shoe may pause during the view of FIG. 7e, so that the user may view the manufacturer's logo and other information on the shoe. The shoe may then be placed  
25 back on the shelf using the same type of rotational motions while shrinking the apparent size of the shoe.

One advantage of rotating and enlarging the image of the product as shown in FIGS. 7a-7e is that it replicates the type of inspection a user in a brick-  
30 and-mortar store might give the product. The user need only click on the product once to initiate the zoom function. Because the product is viewed from various angles, this technique may be more satisfying to the

user than providing simple linear magnification options. If desired, however, a zoom function without rotation may be used.

Although the moving images that are displayed  
5 during the rotational zoom of FIGS. 7a-7e may appear to be the result of a video clip, such images need not be produced using video images, but may be produced using modeling and animation tools such as the Studio MAX  
10 tools or other such tools. In general, either approach may be used. Using video to encode the moving image clip may reduce production overhead and may provide high-quality images, but may require more bandwidth to distribute to the user than content created using modeling and animation tools.

15 Another illustrative shopping service that may be provided is a food shopping service. A virtual supermarket is shown in FIG. 8. Three-dimensional viewing region 80 may contain an interactive three-dimensional representation of the interior of a  
20 supermarket. The user may navigate around the supermarket by, for example, clicking on various signs in region 80 such as sign 84 (for the baby section) or sign 86 (for the cereal section). The user may also navigate within the supermarket by clicking on various  
25 supermarket aisles in three-dimensional map 88. The user may also navigate within the supermarket by clicking on various categories displayed in category list 87. Scroll options such as options 83 and 85 may be used to scroll through list 87. The user's current  
30 location may be indicated in region 89 and by position indicator 91. As with the images displayed in region 24 of the sports store, the images displayed in region 80 may be smoothly changed from one scene to the next

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to create the virtual reality illusion of walking through a real store.

The user may control the magnification of map 88 using magnification controls 90 and 92.

5           Advertisements such as advertisement 94 may be displayed in three-dimensional view region 80. Various actions may be taken when the user clicks on an advertisement. For example, the user may be presented with more information on the advertised product or  
10 service. The user may also be provided with an opportunity to purchase the advertised product (e.g., by being presented with an on-screen option to add the product to the user's shopping basket). If desired, the user may be directed toward the web site of the  
15 advertiser or any other suitable location on the Internet.

The user may search for products using search function 96. When a product is located, the category for the product may be automatically displayed in the  
20 center of region 87 and the product list 98 may be automatically focused on the product. If desired, the user may also be automatically taken to the location within the virtual supermarket where the product is located.

25           A product such as product 82 may be selected by the user (e.g., by clicking on it). When the product is clicked on, product details for the product may be automatically displayed in region 100. For example, a text description 102 of the product and  
30 price information 104 may be displayed. The user may purchase the product by clicking on add option 106.

Other options that may be provided include special offers option 108, shopping cart option 110,

customer service option 112, and configure option 114.

When the user selects special offers option 108, the shopping service may present the user with information regarding special offers such as discounts  
5 or sales on particular items.

If the user clicks on shopping cart option 110, the contents of the user's shopping cart may be displayed in region 100 and shopping cart tab 116 may be highlighted.

10 If the user selects customer service option 112, various options may be presented for the user that assist the user in contacting customer service. For example, an e-mail address and telephone number for customer service may be displayed. If desired, a live  
15 Internet telephone link may be established between a customer service representative and the user. The link may be established using the microphone and speakers and (if desired) the video camera associated with client 18 to connect to a customer service  
20 representative at remote computer equipment over communications network 16.

If the user selects configure option 114, the user may be provided with on-screen options that allow the user to adjust various configuration settings for  
25 the shopping service.

When the user clicks on a product in region 80, a short clip (either a computer-generated clip or a video clip) may be displayed in area 118 of region 100. A status icon 120 may also be displayed to indicate  
30 whether the clip is running or has been paused.

As shown in FIG. 9, when the user places a pointer over icon 120, an expanded bar 122 may be displayed. Bar 122 may contain various options. For

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example, bar 122 may contain an option 122a that the user may click on to pause or resume playback of the clip. The user may click on option 122b to browse the website of the shopping service provider or other  
5 suitable entity. The user may click on option 122c to access on-line help. The user may click on option 122d to turn the sound on or off. An error icon may be displayed if there is an error during playback.

When the user plays the clip in region 118,  
10 the selected product may be rotated and zoomed as shown in FIGS. 7a-7e. As shown in FIG. 10, the image of the product in region 118 may include a view of the ingredients on the product's label.

If the user clicks on add option 106  
15 (FIG. 10), the viewer's current shopping cart may be displayed in region 100, as shown in FIG. 11.

Another illustrative virtual reality shopping environment is shown in FIGS. 12 and 13. The shopping environment of FIGS. 12 and 13 relates to a shopping  
20 service for artwork.

When the user starts the shopping service, the user may be presented with interactive three-dimensional view region 124.

A map 126 (e.g., a three-dimensional plan  
25 view map) may also be displayed. The user may purchase a painting displayed in interactive three-dimensional view region 124 by dragging that painting to shopping bag 128.

Details on the currently selected painting  
30 may be displayed in region 130. Region 130 may contain last painting option 132 or other such options that provide navigational links between paintings. If the paintings are categorized by artist, a list 134 of the

paintings associated with each artist may be displayed. The current artist may be selected by clicking on one of artist options 136. An artist or painting may also be located using search option 138.

- 5 Purchased items option 140 may be used to view the contents of the user's shopping bag. Configuration option 142 may be used to allow the user to adjust various configuration options for the shopping service. Help desk option 144 may be selected  
10 when the user desires to contact a customer service representative.

- As the user navigates through the virtual reality environment created by the three-dimensional images of region 124, icon 132 may be used to display  
15 status information. When the user places a pointer over icon 132, a control panel such as control panel 146 of FIG. 13 may be displayed.

- The user may click on walk/don't walk option 148a to pause or resume navigation. The color of  
20 option 148a may change depending on whether the user is moving through the virtual reality environment or is stationary. If the user is stationary, a green figure may be displayed that the user may click on to resume walking. If the user is moving, a red figure may be  
25 displayed that the user may click on to pause navigation.

- Speed control option 148b may have a slider control to control the speed of the user's movement. The user may drag the slider to speed up or slow down  
30 navigation.

Running speed control option 148c may be used to adjust the user's movement to the maximum possible

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speed. The user may hold down the mouse button on the running figure to bring navigation to maximum speed.

Previous/next options 148d allow the user to browse forward and in reverse through the three-  
5 dimensional content in region 124.

When the user selects home option 148e, the user may be taken to the home page of the shopping service provider or other suitable entity or may be taken to any other suitable Internet site or location.

10 When the user clicks on help option 148f, the user may be provided with context-sensitive interactive on-line help.

Option 148g may be used to turn the sound on or off.

15 When the user begins to navigate a virtual reality environment, initial header data may be immediately streamed to client 18 and buffered in memory. Once the initial data has been buffered, virtual reality browser 20 (or any appropriate player  
20 application) may display the virtual reality environment for the user. Further data may be streamed from server 12 as needed during navigation. Status indicator icon 132 may be used to provide feedback regarding the processor load on client 18 and regarding  
25 the incoming streaming data from server 12. The appearance of status indicator icon 132 may be changed in real time to reflect the current status of the client's processor and the status of network 16.

As shown in FIG. 14, icon 132 may be provided  
30 with a segmented outer ring 150 and an inner circle 152. The outer ring 150 and inner circle 152 may be displayed in various static and moving colors to indicate the present status of the shopping service.

Outer ring 150 may be used to indicate buffering status and inner circle 152 may be used to indicate playback and client processor load status.

For example, outer ring 150 may be displayed  
5 in green when the connection to communications network 16 is normal. When the network connection speed is unusually slow, outer ring 150 may be displayed in red. During navigation, inner circle 152 may be displayed as  
10 constant green. When navigation is paused, inner circle 152 may be displayed as blinking green. When the connection slows, or when client 18 is waiting for additional data, inner circle 150 may be displayed as blinking red.

The green segments in outer ring 150 may be  
15 used to indicate the amount of data that has been buffered by client 18. When all of the segments are highlighted, the buffer is full and server 12 may not send further data until the buffer is free. When one  
20 or more of the green segments in outer ring 150 is not lit, the buffer is not full and server 12 may continue to stream data to client 18. Red segments in outer ring 150 indicate a slower than normal Internet connection. Streaming may continue, but at a slower rate than normal.

25 When there is no further data to display, virtual reality browser 20 may cease to navigate the virtual reality environment and inner circle 152 may be darkened.

Illustrative steps involved in using system  
30 10 to provide users with a virtual reality shopping experience are shown in FIG. 15. At step 154, a user may be provided with an opportunity to establish a link with the virtual reality shopping service. For



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example, the user may be provided with virtual reality browser software that allows the user to access a virtual reality shopping server over the Internet or other suitable communications network.

5           At step 156, after the user has established a link with the service, the user may be provided with a virtual reality shopping environment. For example, the user may use various on-screen options such as navigation controls, links, search functions, etc. to  
10 move through three-dimensional images of the interior of a virtual store or mall. When the user locates items of interest, the user may obtain additional information on those items by clicking on the items. A rotational zoom feature or other suitable image  
15 enlargement or rotation function may be used to allow users to closely inspect products of interest. Products may be added to the user's shopping cart (or shopping basket or shopping bag, etc.) by clicking and dragging or by clicking on an add to cart option. The  
20 user may obtain information on specials and may access customer service. Advertisements may be displayed.

          After the user has selected certain products to be purchased, the user's order may be processed and the products shipped to the user (if desired) at step  
25 158.

          For clarity, the present invention has been described primarily in the context of particular shopping applications (i.e., a sports shop, a supermarket, and an art store). These are merely  
30 illustrative examples. Any suitable types of products and services may be sold by a virtual reality shopping application. Moreover, the navigational features and

other features described in connection with the shopping service may be used in virtual reality environments that are not related to shopping.

- 5 The foregoing is merely illustrative of the principles of this invention and various modifications can be made by those skilled in the art without departing from the scope and spirit of the invention.

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What Is Claimed is:

1. A method for providing a user with an on-line shopping experience using a virtual reality system having a server for providing shopping service content and a client having a display on which the user may view the shopping service content, wherein the server and client are connected over a communications network, the method comprising:

displaying an interactive three-dimensional view region on the display of the client that contains three-dimensional views of the interior of a virtual store through which the user may navigate; and

simultaneously displaying a map on the display that shows the layout of the interior of the store.

2. The method of claim 1 further comprising simultaneously displaying a plurality of product category options on the display, each corresponding to a particular category of product.

3. The method of claim 2 wherein each category option includes an image corresponding to a respective product category.

4. The method of claim 2 further comprising simultaneously displaying a product details region on the display containing an image of a given product and simultaneously displaying a user selectable option to add the given products to a shopping cart.

5. The method of claim 1 further comprising providing the user with an opportunity to select an item of interest from the interactive three-dimensional view region by clicking on that item and displaying a click of the selected item when the user clicks on the item that zooms in on the selected item.

6. The method of claim 5 wherein displaying the clip comprises displaying a clip of the selected item in which the selected item is rotated.

7. The method of claim 5 wherein displaying the clip comprises displaying an expanded option bar including at least one of a pause option, a playback option, an item website option, a sound ON, sound OFF option, and a status icon.

8. The method of claim 1 further comprising displaying a shopping cart region on the display and allowing the user to click on and drag the given item from the three-dimensional view region to the shopping cart region when the user desires to purchase the given item.

9. The method of claim 1 further comprising simultaneously displaying a search option on the display with which the user may search for products of interest.

10. The method of claim 1 further comprising simultaneously displaying a plurality of department options on the display that the user may select when it is desired to new products in a given department of the

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store and automatically updating the three-dimensional view of the interior of the store that is displayed in the three-dimensional new region to show the products in the given department when the user selects the department option for that department.

11. The method of claim 1 further comprising simultaneously displaying a selectable control option on the display that allows the user to pause movement through the three-dimensional views when the user is moving and allows the user to resume movement through the three-dimensional views when the user is paused.

12. The method of claim 11 further comprising providing an option on the display that allows the user to control the speed of navigation through the three-dimensional views.

13. The method of claim 1 further comprising simultaneously displaying a map on the display that shows the layout of a mall, wherein the mall includes a plurality of different stores.

14. The method of claim 1 further comprising displaying a navigation indicator which shows status information related to a user's navigation through the store.

15. The method of claim 14 further comprising displaying a position indicator which displays the position of the user in the store as a triangle on the map, the triangle including a narrow point that may indicate the direction user is facing.

16. The method of claim 1 further comprising displaying directional arrow options that allow the user to navigate through the store.

17. The method of claim 1 further comprising a go there option that allows the user to navigate to a specific item when the user clicks the go there option associated with the specific item.

18. The method of claim 1 further comprising displaying web links on the display that allow the user to access service options available through a shopping service.

19. The method of claim 1 further comprising allowing user access to at least one of a checkout option, a customer service option, a special offers option and a configuration option.

20. The method of claim 1 further comprising replicating a physical inspection of a selected item on the display, the replicating including rotating and enlarging the item.

21. The method of claim 1 further comprising providing a continuous zooming image of an item in the display.

22. The method of claim 1 further comprising allowing a user to enlarge or decrease the size of an item on the display.

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23. The method of claim 1 further comprising providing a map magnification control option.

24. The method of claim 1 further comprising displaying a processor load status indicator on the display.

25. The method of claim 24 further comprising updating the processor load status indicator at pre-determined intervals.

26. The method of claim 1 further comprising displaying a buffering status indicator on the display.

27. The method of claim 26 further comprising updating the buffering status indicator at pre-determined intervals.

28. A method for providing a user with an on-line shopping experience using a virtual reality system having a server for providing shopping service content and a client having a display on which the user may view the shopping service content, wherein the server and client are connected over a communications network, the method comprising:

displaying an interactive three-dimensional view region on the display of the client that contains three-dimensional views of the interior of a virtual store through which the user may navigate; and

simultaneously displaying a plurality of product category options on the display, each corresponding to a particular category of product.

29. The method of claim 28 wherein each category option includes an image corresponding to a respective product category.

30. The method of claim 29 further comprising simultaneously displaying a product details region on the display containing an image of a given product and simultaneously displaying a user selectable option to add the given products to a shopping cart.

31. The method of claim 28 further comprising providing the user with an opportunity to select an item of interest from the interactive three-dimensional view region by clicking on that item and displaying a click of the selected item when the user clicks on the item that zooms in on the selected item.

32. The method of claim 31 wherein displaying the clip comprises displaying a clip of the selected item in which the selected item is rotated.

33. The method of claim 31 wherein displaying the clip comprises displaying an expanded option bar including at least one of a pause option, a playback option, an item website option, a sound ON, sound OFF option, and a status icon.

34. The method of claim 28 further comprising displaying a shopping cart region on the display and allowing the user to click on and drag the given item from the three-dimensional view region to the shopping cart region when the user desires to purchase the given item.



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35. The method of claim 28 further comprising simultaneously displaying a search option on the display with which the user may search for products of interest.

36. The method of claim 28 further comprising simultaneously displaying a plurality of department options on the display that the user may select when it is desired to new products in a given department of the store and automatically updating the three-dimensional view of the interior of the store that is displayed in the three-dimensional new region to show the products in the given department when the user selects the department option for that department.

37. The method of claim 28 further comprising simultaneously displaying a selectable control option on the display that allows the user to pause movement through the three-dimensional views when the user is moving and allows the user to resume movement through the three-dimensional views when the user is paused.

38. The method of claim 37 further comprising providing an option on the display that allows the user to control the speed of navigation through the three-dimensional views.

39. The method of claim 28 further comprising simultaneously displaying a map on the display that shows the layout of the interior of the

store and simultaneously displaying a map on the display that shows the layout of a mall, wherein the mall includes a plurality of different stores.

40. The method of claim 28 further comprising displaying a navigation indicator which shows status information related to a user's navigation through the store.

41. The method of claim 40 further comprising simultaneously displaying a map on the display that shows the layout of the interior of the store and displaying a position indicator which displays the position of the user in the store as a triangle on the map, the triangle including a narrow point that may indicate the direction user is facing.

42. The method of claim 28 further comprising displaying directional arrow options that allow the user to navigate through the store.

43. The method of claim 28 further comprising a go there option that allows the user to navigate to a specific item when the user clicks the go there option associated with the specific item.

44. The method of claim 28 further comprising displaying web links on the display that allow the user to access service options available through a shopping service.

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45. The method of claim 28 further comprising allowing user access to at least one of a checkout option, a customer service option, a special offers option and a configuration option.

46. The method of claim 28 further comprising replicating a physical inspection of a selected item on the display, the replicating including rotating and enlarging the item.

47. The method of claim 28 further comprising providing a continuous zooming image of an item in the display.

48. The method of claim 28 further comprising allowing a user to enlarge or decrease the size of an item on the display.

49. The method of claim 28 further comprising simultaneously displaying a map on the display that shows the layout of the interior of the store and providing a map magnification control option.

50. The method of claim 28 further comprising displaying a processor load status indicator on the display.

51. The method of claim 50 further comprising updating the processor load status indicator at pre-determined intervals.

52. The method of claim 28 further comprising displaying a buffering status indicator on the display.

53. The method of claim 52 further comprising updating the buffering status indicator at pre-determined intervals.

54. A method for providing a user with an on-line shopping experience using a virtual reality system having a server for providing shopping service content and a client having a display on which the user may view the shopping service content, wherein the server and client are connected over a communications network, the method comprising:

displaying an interactive three-dimensional view region on the display of the client that contains three-dimensional views of the interior of a virtual store through which the user may navigate;

simultaneously displaying a product details region on the display containing an image of a given product; and

simultaneously displaying a user-selectable option to add the given product to a shopping cart.

55. A method for providing a user with an on-line shopping experience using a virtual reality system having a server for providing shopping service content and a client having a display on which the user may view the shopping service content, wherein the server and client are connected over a communications network, the method comprising:

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displaying an interactive three-dimensional view region on the display of the client that contains three-dimensional views of the interior of a virtual store through which the user may navigate; providing the user with an opportunity to select an item of interest from the interactive three-dimensional view region by clicking on that item; and

displaying a clip of the selected item when the user clicks on the item that zooms in on the selected item.

56. The method defined in claim 55 wherein displaying the clip comprises displaying a clip of the selected item in which the selected item is rotated.

57. A method for providing a user with an on-line shopping experience using a virtual reality system having a server for providing shopping service content and a client having a display on which the user may view the shopping service content, wherein the server and client are connected over a communications network, the method comprising:

displaying an interactive three-dimensional view region on the display of the client that contain three-dimensional views through which the user may navigate;

displaying a shopping cart region on the display; and

allowing the user to click on and drag a given item from the three-dimensional view region to the shopping cart region when the user desires to purchase the given item.

58. A method for providing a user with an on-line shopping experience using a virtual reality system having a server for providing shopping service content and a client having a display on which the user may view the shopping service content, wherein the server and client are connected over a communications network, the method comprising:

displaying an interactive three-dimensional view region on the display of the client that contains three-dimensional views through which the user may navigate; and

simultaneously displaying a search option on the display with which the user may search for products of interest.

59. A method for providing a user with an on-line shopping experience using a virtual reality system having a server for providing shopping service content and a client having a display on which the user may view the shopping service content, wherein the server and client are connected over a communications network, the method comprising:

displaying an interactive three-dimensional view region on the display of the client that contain three-dimensional views of the interior of a store through which the user may navigate;

simultaneously displaying a plurality of department options on the display that the user may select when it is desired to view products in a given department of the store; and

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automatically updating the three-dimensional view of the interior of the store that is displayed in the three-dimensional view region to show the products in the given department when the user selects the department option for that department.

60. A method for providing a user with an on-line shopping experience using a virtual reality system having a server for providing shopping service content and a client having a display on which the user may view the shopping service content, wherein the server and client are connected over a communications network, the method comprising:

displaying an interactive three-dimensional view region on the display of the client that contains three-dimensional views of the interior of a store through which the user may navigate; and

simultaneously displaying a selectable control option on the display that allows the user to pause movement through the three-dimensional views when the user is moving and allows the user to resume movement through the three-dimensional views when the user is paused.

61. The method of claim 60 further comprising simultaneously displaying a plurality of product category options on the display, each corresponding to a particular category of product.

62. The method of claim 61 wherein each category option includes an image corresponding to a respective product category.

63. The method of claim 61 further comprising simultaneously displaying a product details region on the display containing an image of a given product and simultaneously displaying a user selectable option to add the given products to a shopping cart.

64. The method of claim 60 further comprising providing the user with an opportunity to select an item of interest from the interactive three-dimensional view region by clicking on that item and displaying a click of the selected item when the user clicks on the item that zooms in on the selected item.

65. The method of claim 64 wherein displaying the clip comprises displaying a clip of the selected item in which the selected item is rotated.

66. The method of claim 65 wherein displaying the clip comprises displaying an expanded option bar including at least one of a pause option, a playback option, an item website option, a sound ON, sound OFF option, and a status icon.

67. The method of claim 60 further comprising displaying a shopping cart region on the display and allowing the user to click on and drag the given item from the three-dimensional view region to the shopping cart region when the user desires to purchase the given item.



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68. The method of claim 60 further comprising simultaneously displaying a search option on the display with which the user may search for products of interest.

69. The method of claim 60 further comprising simultaneously displaying a plurality of department options on the display that the user may select when it is desired to new products in a given department of the store and automatically updating the three-dimensional view of the interior of the store that is displayed in the three-dimensional new region to show the products in the given department when the user selects the department option for that department.

70. The method of claim 60 further comprising providing an option on the display that allows the user to control the speed of navigation through the three-dimensional views.

71. The method of claim 60 further comprising simultaneously displaying a map on the display that shows the layout of the interior of the store and simultaneously displaying a map on the display that shows the layout of a mall, wherein the mall includes a plurality of different stores.

72. The method of claim 60 further comprising displaying a navigation indicator which shows status information related to a user's navigation through the store.

73. The method of claim 72 further comprising simultaneously displaying a map on the display that shows the layout of the interior of the store and displaying a position indicator which displays the position of the user in the store as a triangle on the map, the triangle including a narrow point that may indicate the direction user is facing.

74. The method of claim 60 further comprising displaying directional arrow options that allow the user to navigate through the store.

75. The method of claim 60 further comprising a go there option that allows the user to navigate to a specific item when the user clicks the go there option associated with the specific item.

76. The method of claim 60 further comprising displaying web links on the display that allow the user to access service options available through a shopping service.

77. The method of claim 60 further comprising allowing user access to at least one of a checkout option, a customer service option, a special offers option and a configuration option.

78. The method of claim 60 further comprising replicating a physical inspection of a selected item on the display, the replicating including rotating and enlarging the item.

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79. The method of claim 60 further comprising providing a continuous zooming image of an item in the display.

80. The method of claim 60 further comprising allowing a user to enlarge or decrease the size of an item on the display.

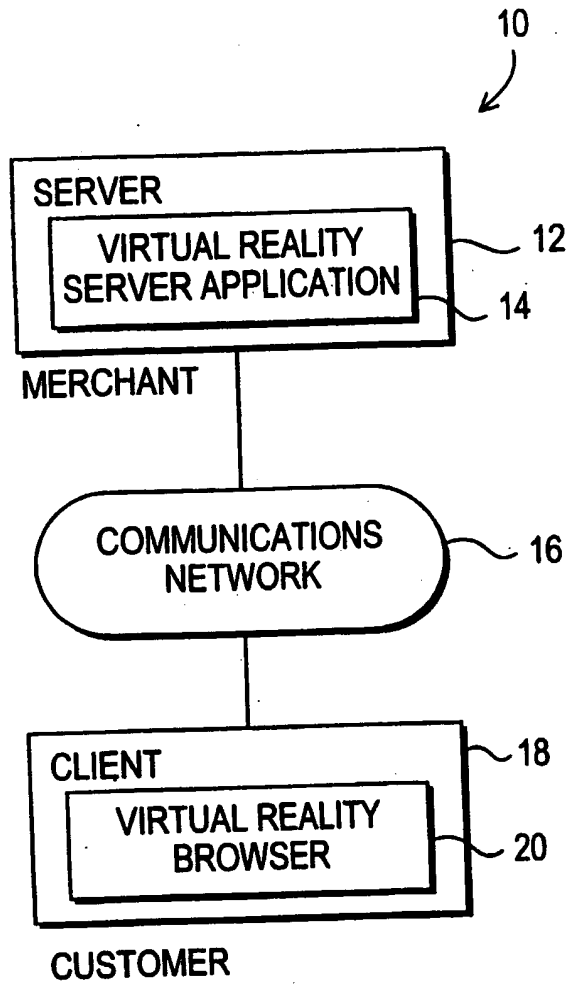
81. The method of claim 60 further comprising simultaneously displaying a map on the display that shows the layout of the interior of the store and providing a map magnification control option.

82. The method of claim 60 further comprising displaying a processor load status indicator on the display.

83. The method of claim 82 further comprising updating the processor load status indicator at pre-determined intervals.

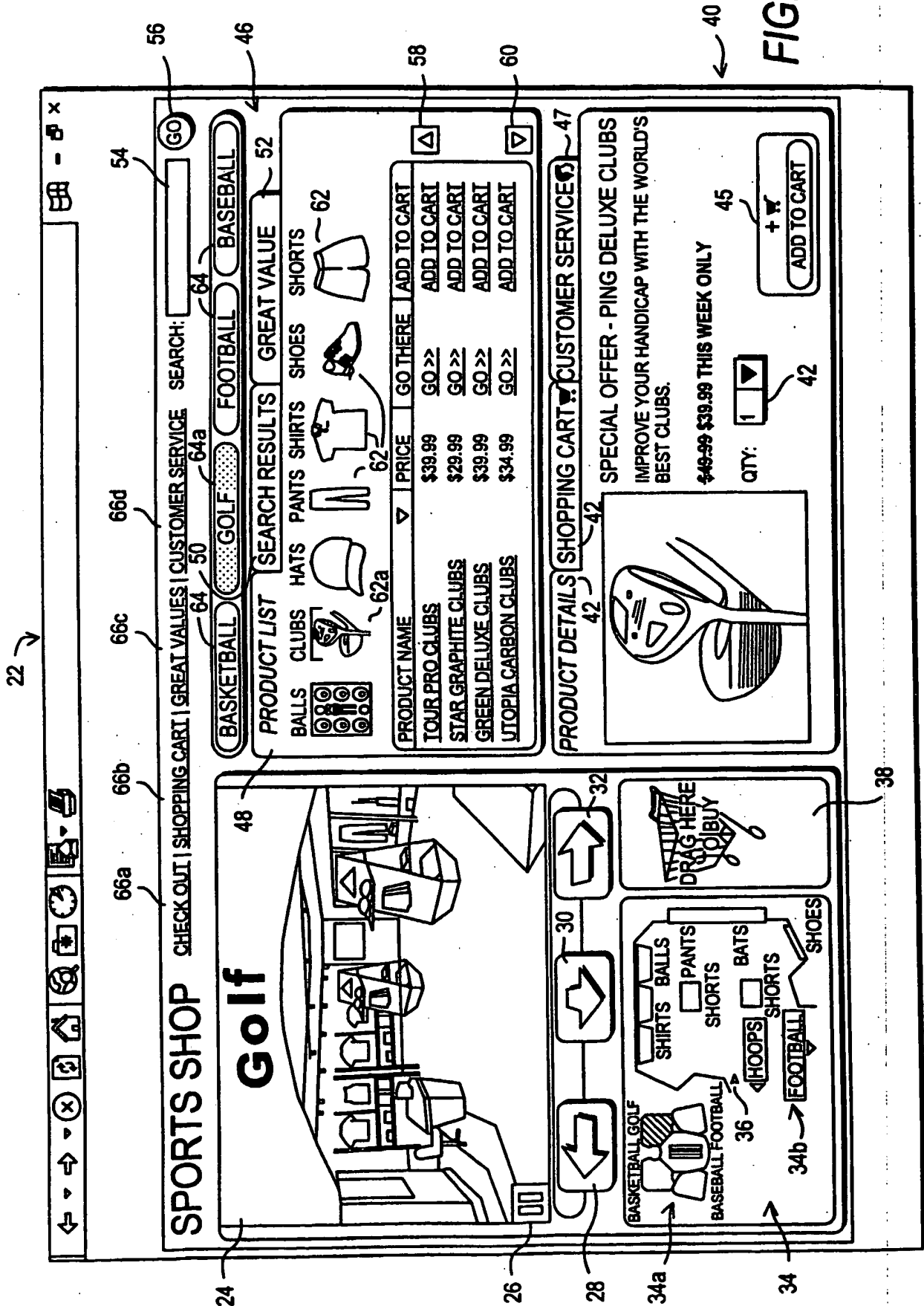
84. The method of claim 60 further comprising displaying a buffering status indicator on the display.

85. The method of claim 84 further comprising updating the buffering status indicator at pre-determined intervals.

**FIG. 1**

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FIG. 2



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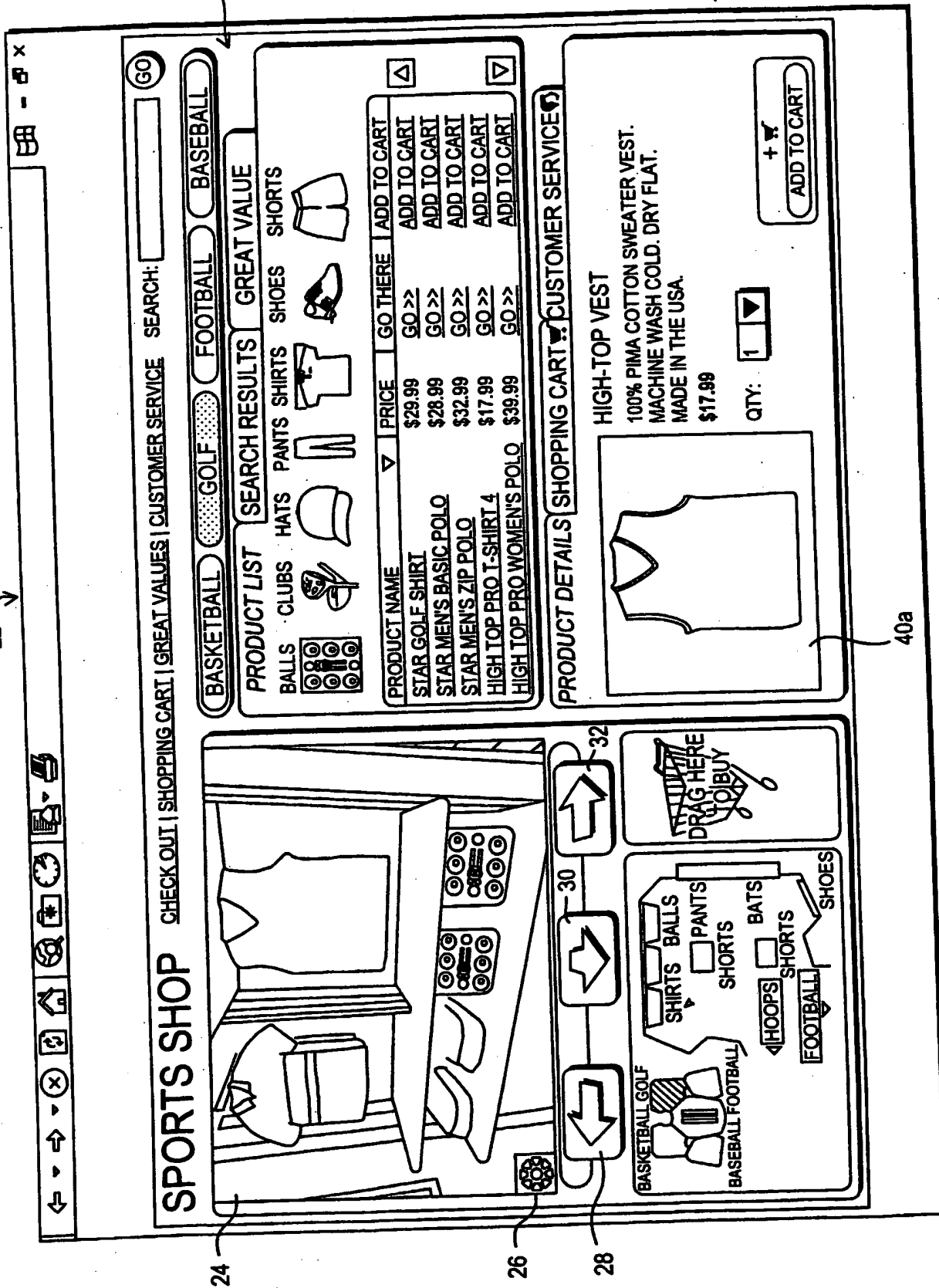
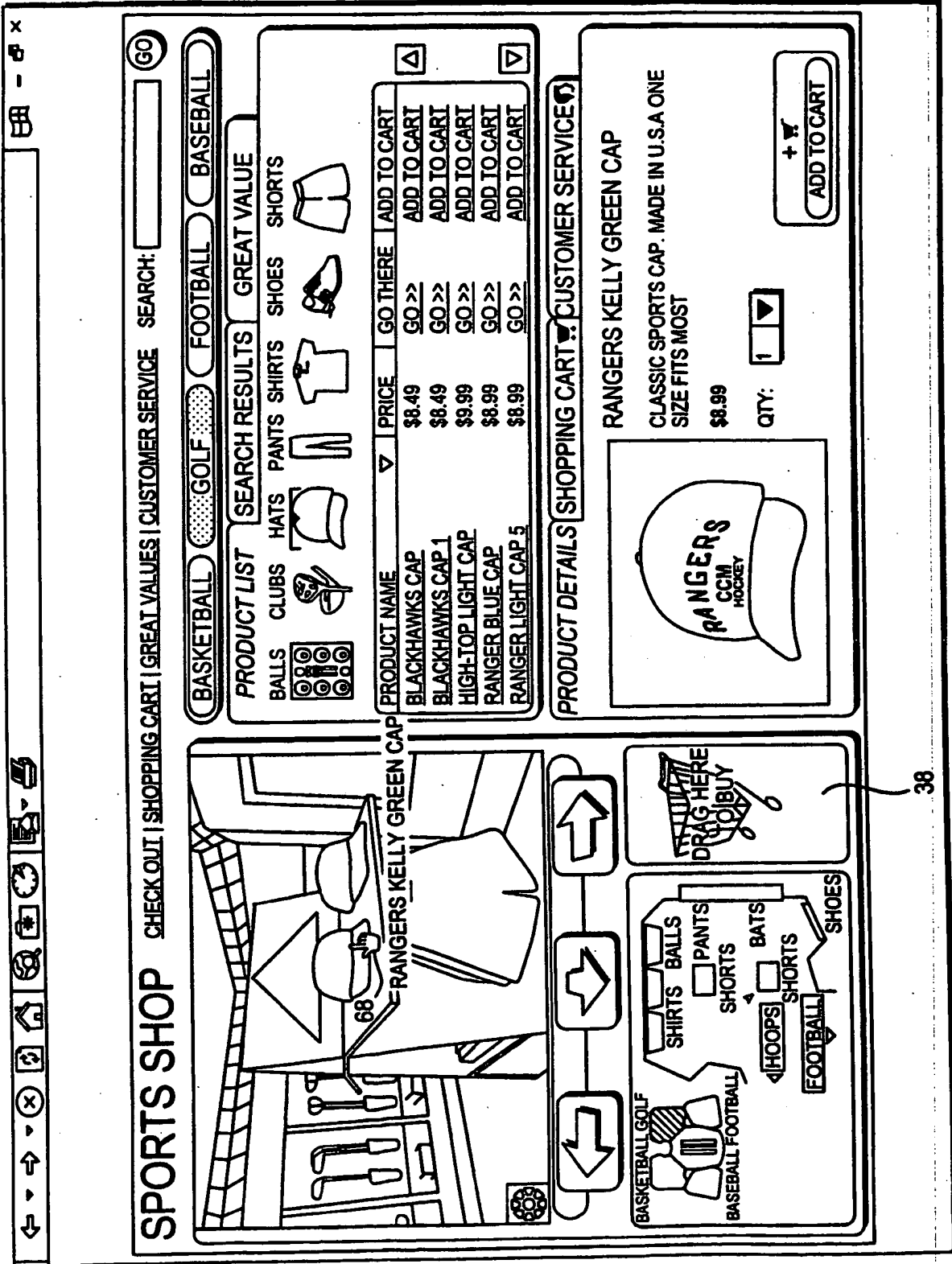
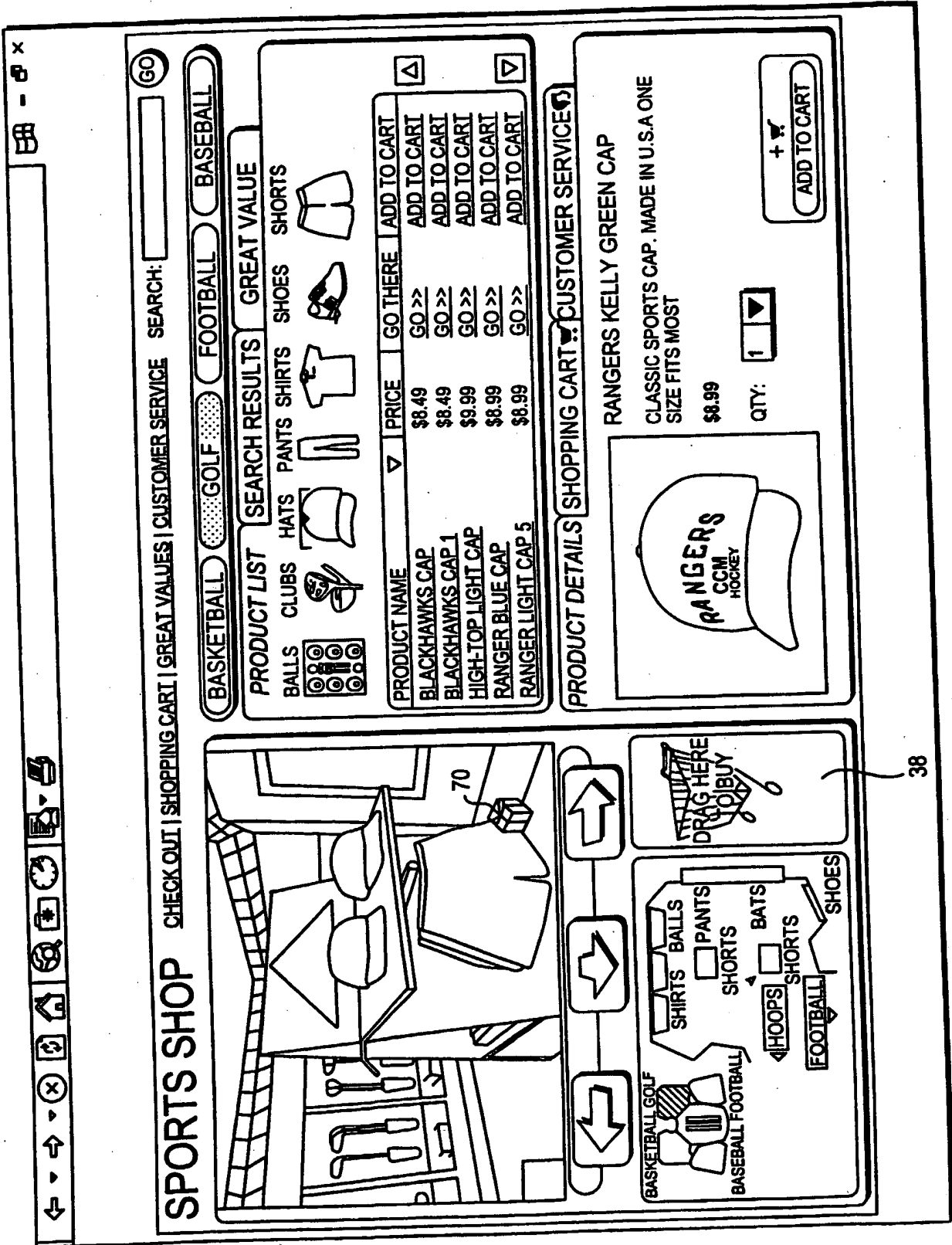


FIG. 3

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FIG. 4







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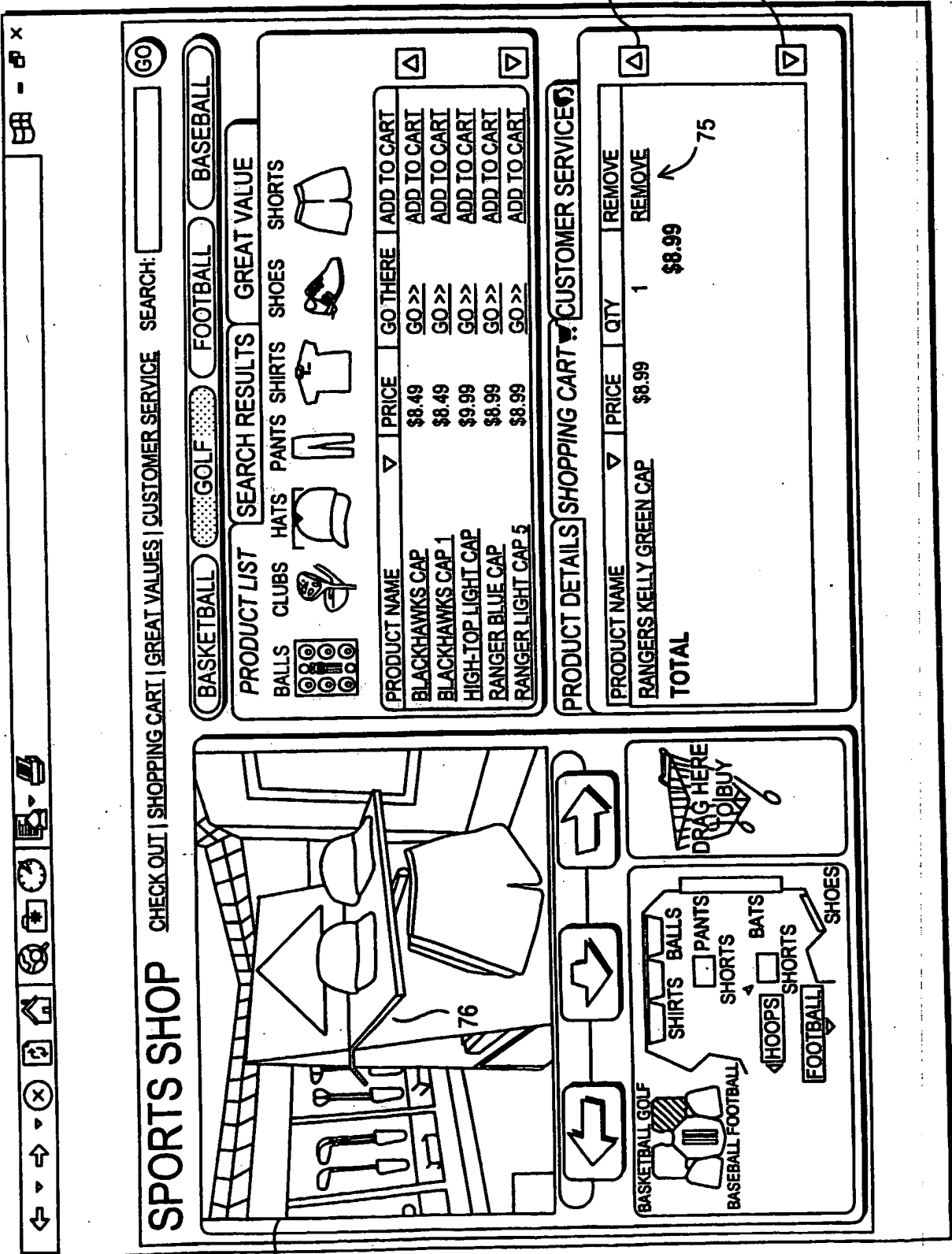


FIG. 7a

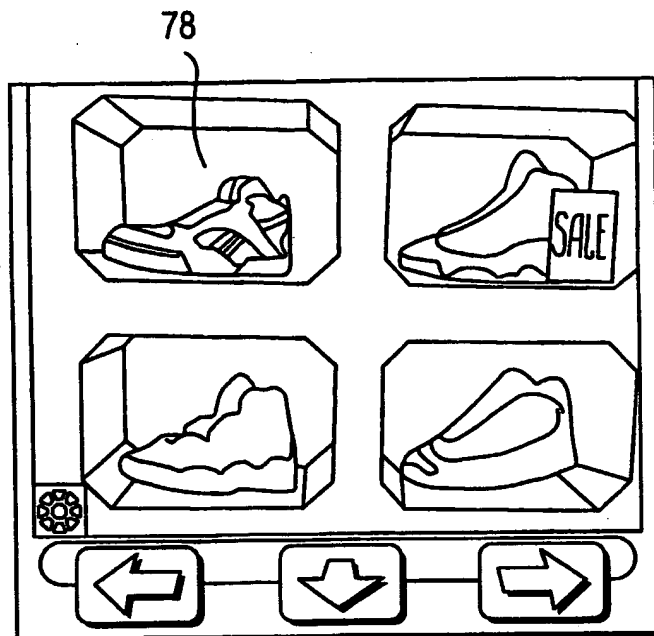
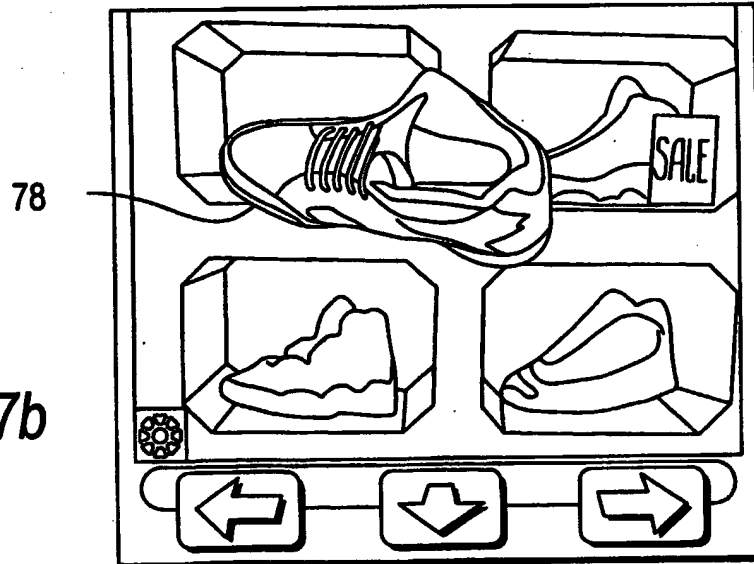


FIG. 7b



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FIG. 7c

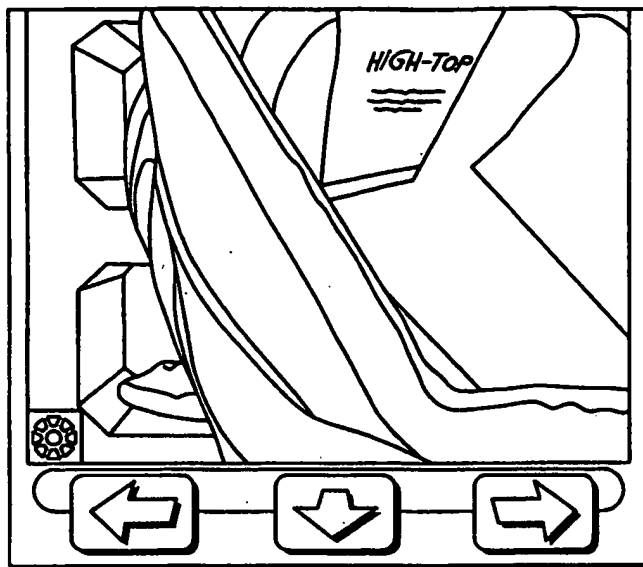


FIG. 7d

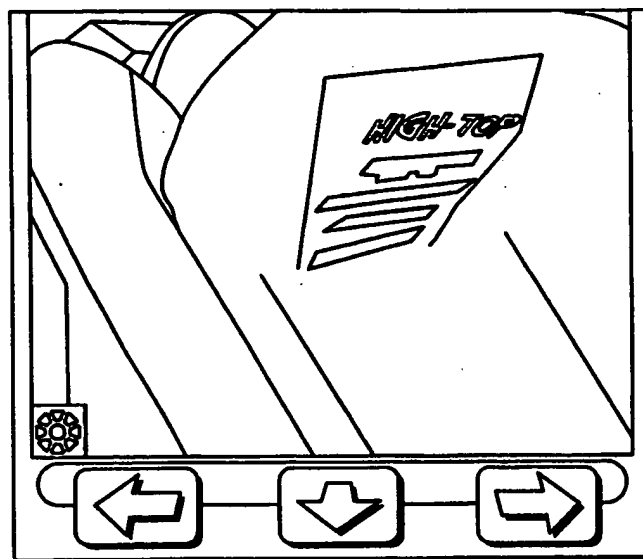
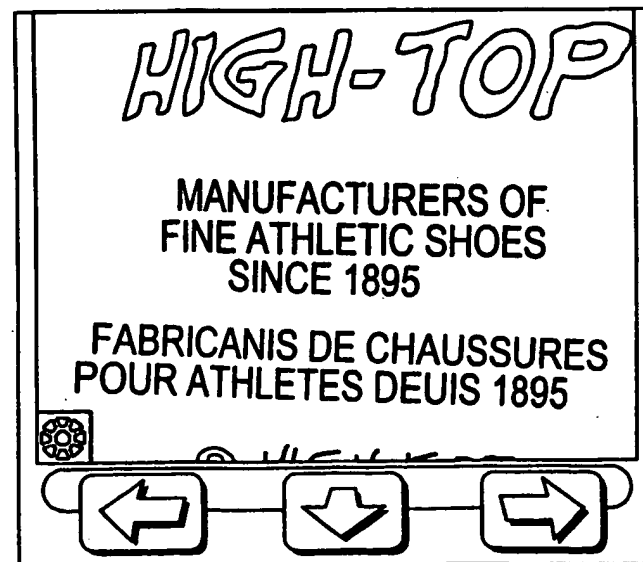
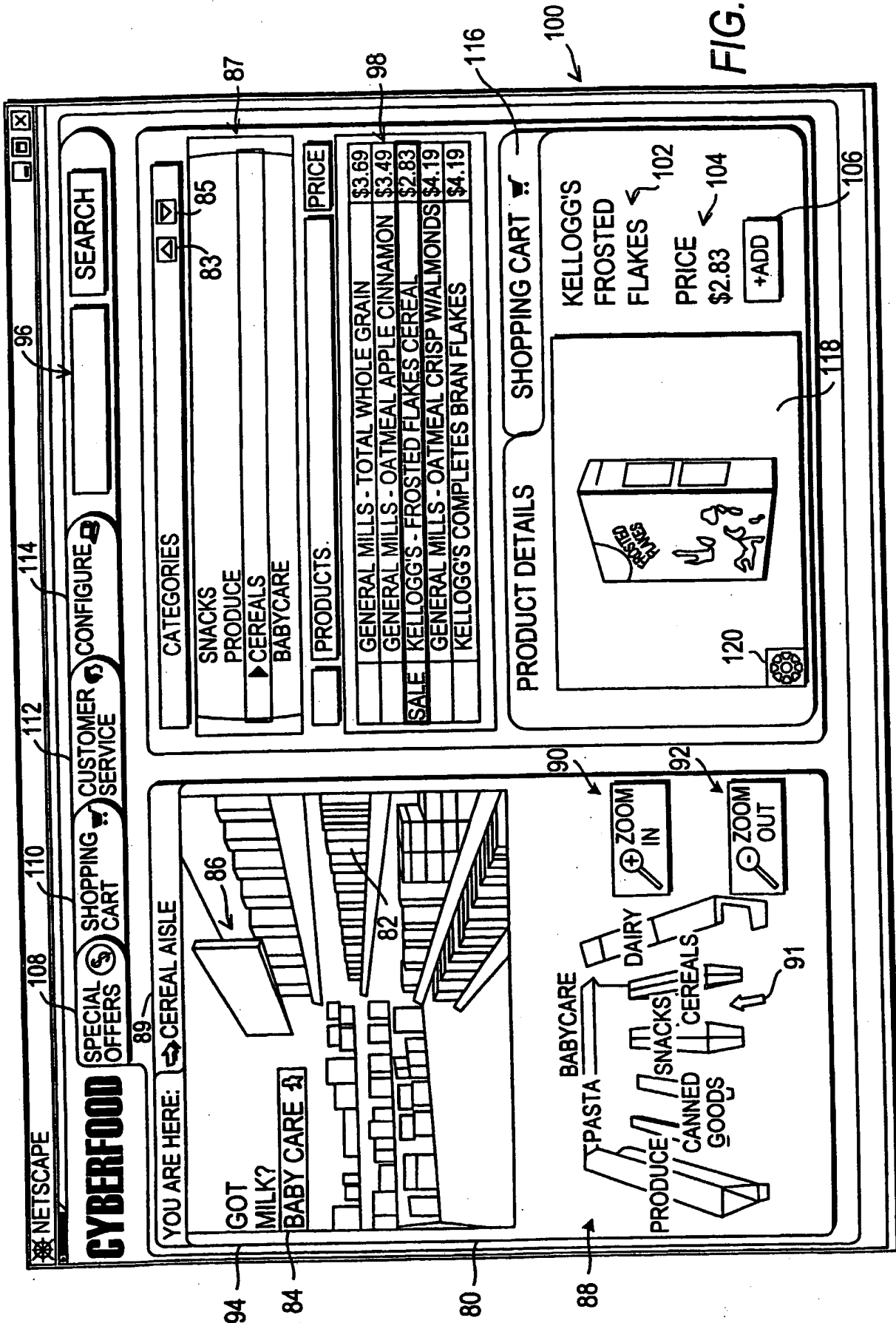


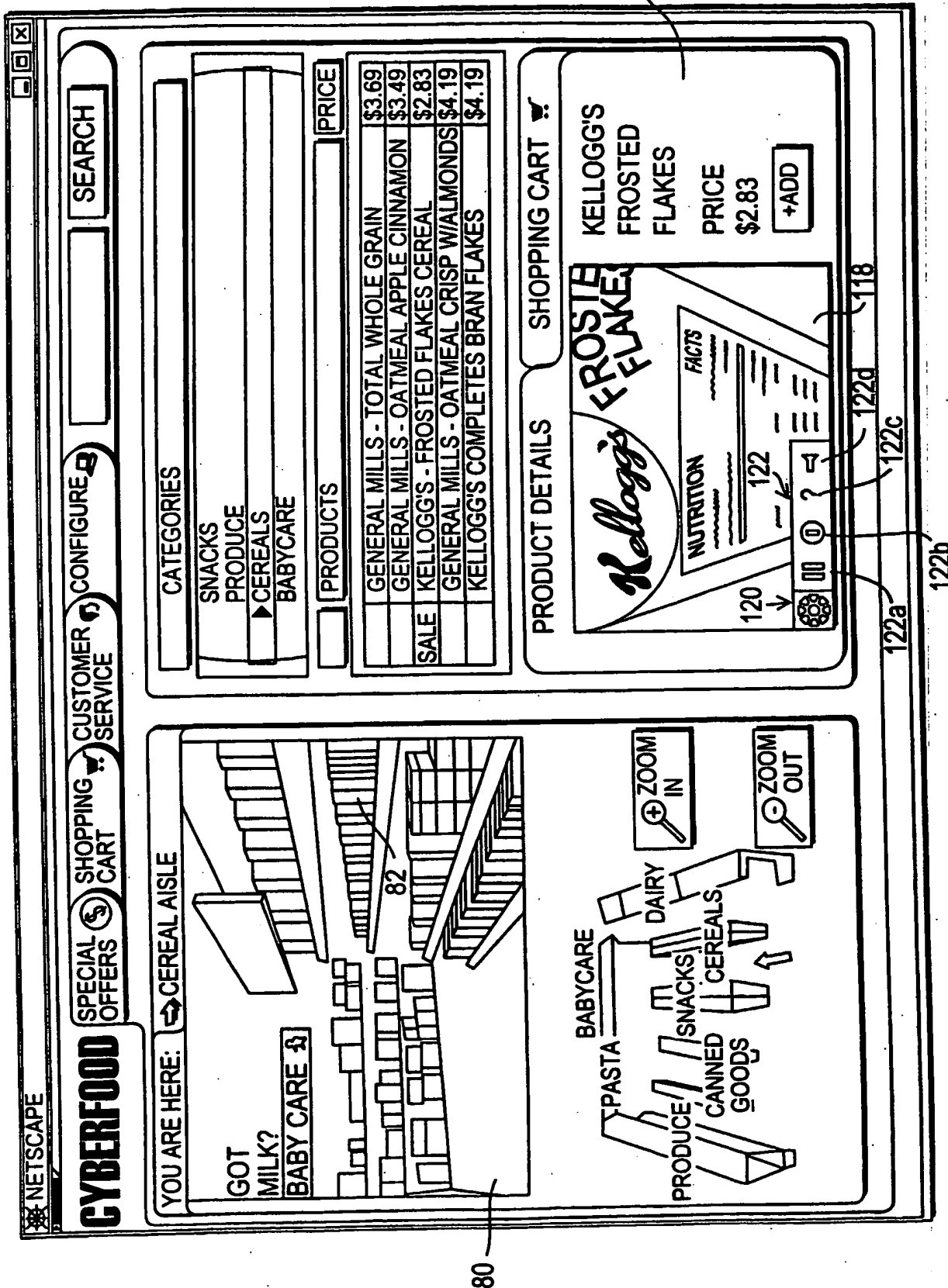
FIG. 7e

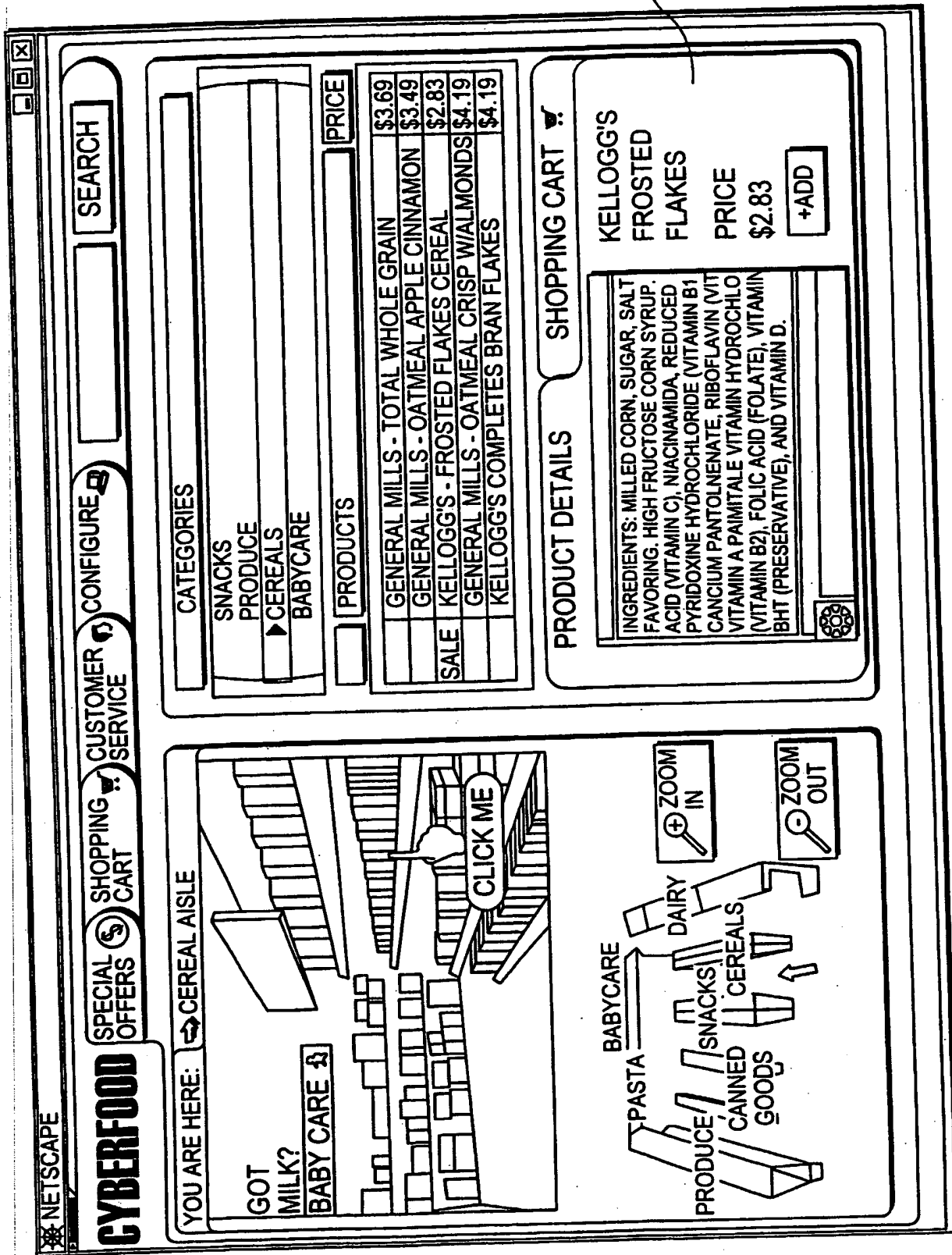




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FIG. 9

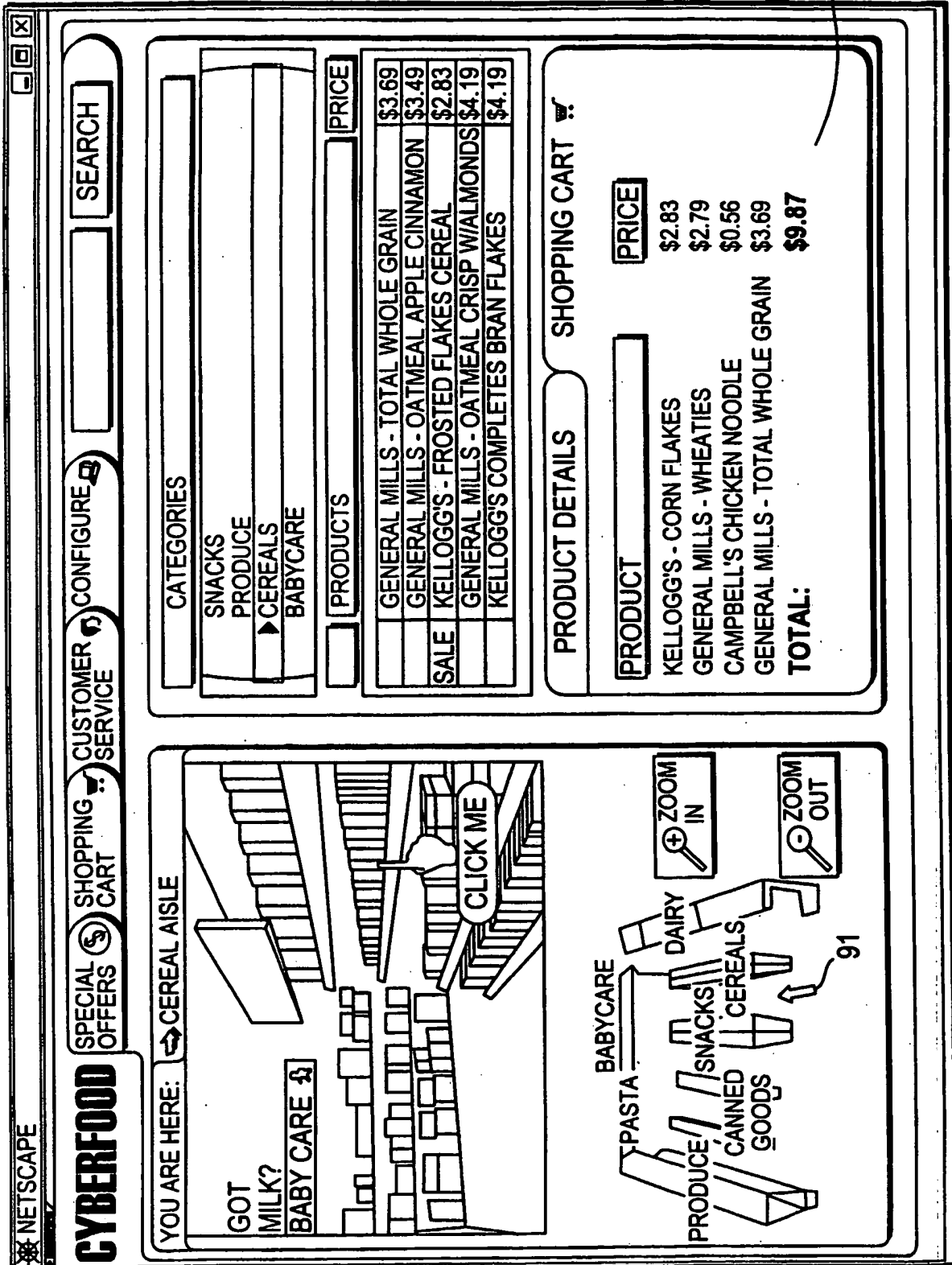


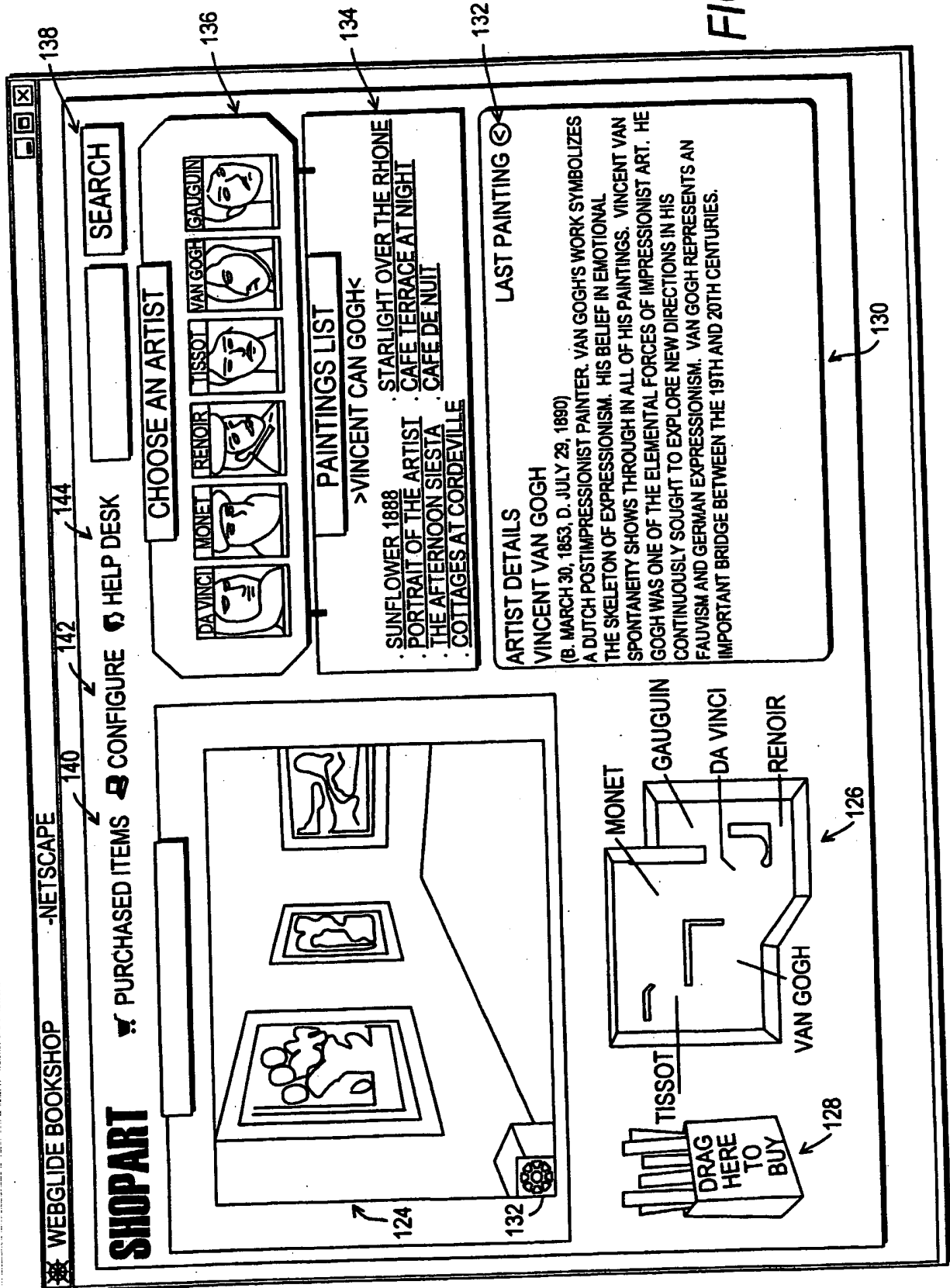


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FIG. 11

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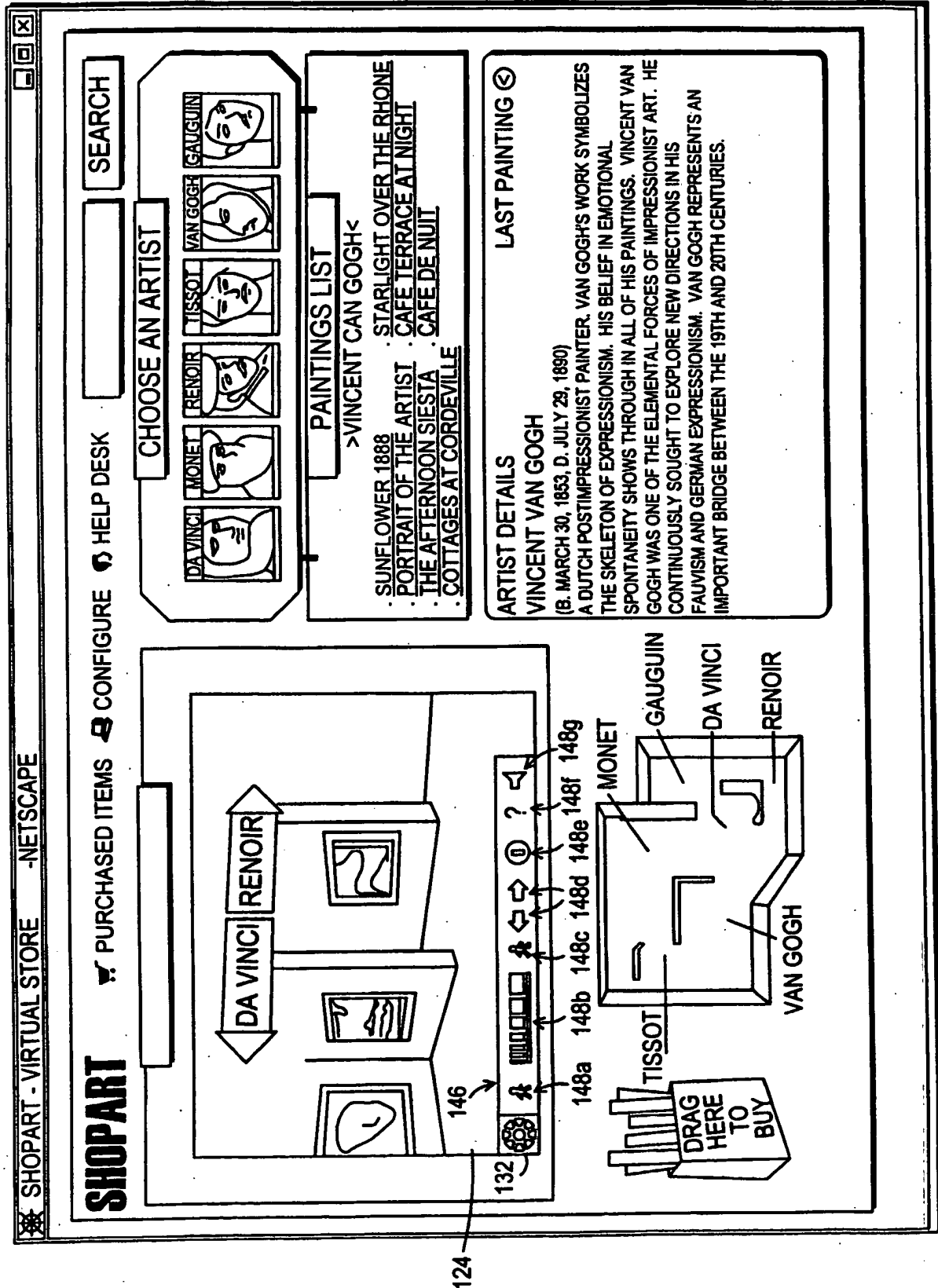


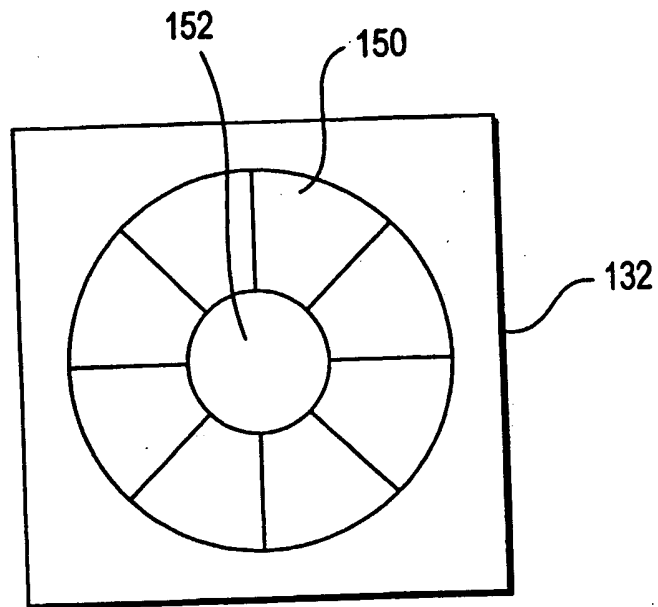




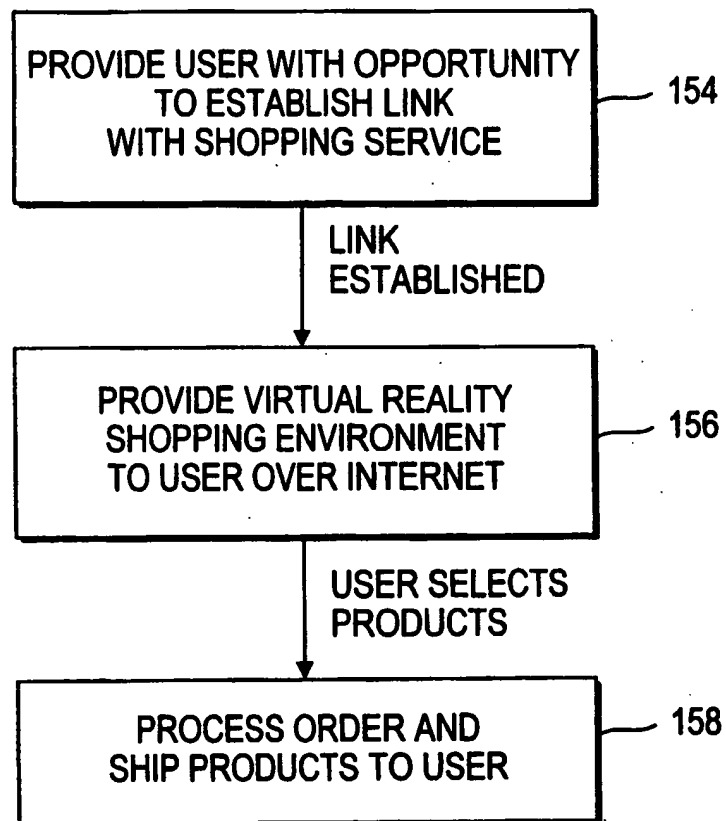
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FIG. 13



**FIG. 14**

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**FIG. 15**

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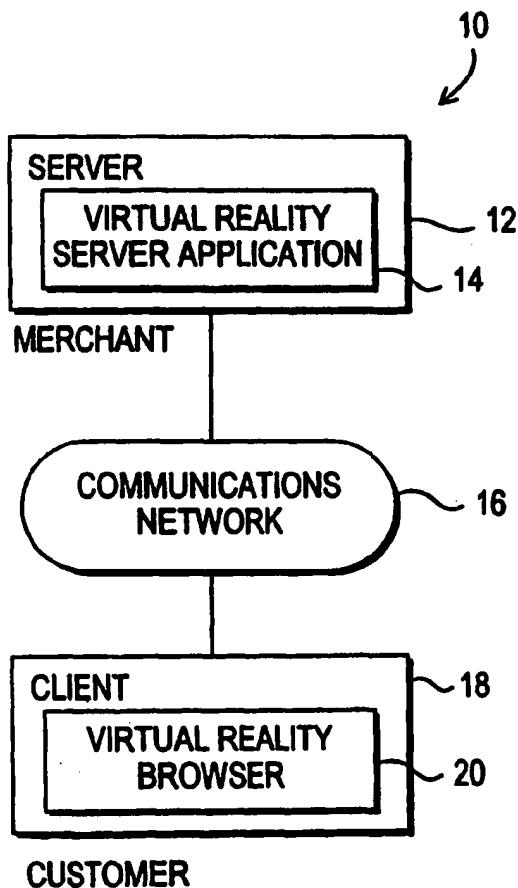
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[Continued on next page]

(54) Title: NATURAL USER INTERFACE FOR VIRTUAL REALITY SHOPPING SYSTEMS



(57) Abstract: A virtual reality shopping system that supports shopping over communications networks such as the Internet is provided. The shopping system has a server for providing interactive three-dimensional content to a client. The three-dimensional content may represent the interior of a virtual store or shopping mall. The user at the client may navigate through the three-dimensional content in real time. The user may click and drag three-dimensional items of interest into a shopping cart. A map may be provided that shows the layout of the interior of the virtual store. Department options may be provided that automatically take the user to the appropriate department of the store. Product category options may be provided that allow the user to locate products in various categories. A search option may be used to search for desired products. A product details region may be used to provide additional information on selected products. A clip of moving images of a product may be provided when the user clicks on a product in the three-dimensional view. The clip may be presented in the form of a rotating and zooming image of the product.



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## INTERNATIONAL SEARCH REPORT

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According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 602 564 A (FUJITA TAKEHIRO ET AL) 11 February 1997 (1997-02-11) column 2, line 49 - column 4, line 34 column 6, line 27 - line 30 figure 2C ---	1-27
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

10 June 2002

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Information on patent family members

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